The Threat Ensemble Vulnerability Assessment Program for Drinking Water Distribution System Security

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Key Words: drinking water, homeland security, health risk assessment

Environmental Issue:
The increased risk of terrorism to our nation's critical infrastructure has focused national attention on the vulnerability of drinking water systems to the intentional introduction of chemical, biological, or radiological contaminants. Contamination of distribution systems may occur through intentional terrorist or criminal acts, but may also occur accidentally by backflow, cross-connection, permeation, or leaching. There is a need to develop a tool or method by which water utilities can design threat mitigation strategies to reduce their vulnerability to contamination.

Scientific Approach:
EPA is developing the Threat Ensemble Vulnerability Assessment (TEVA) Program to analyze the vulnerabilities of drinking water distribution systems, measure public health and economic impacts, and design and evaluate threat mitigation and response strategies. TEVA is a probabilistic framework for assessing the vulnerability of a water utility to a large range of contamination attacks. Monte Carlo simulations generate ensembles of scenarios, and statistics are analyzed to explore the feasibility of scenarios, identify vulnerable areas of the water distribution network, and analyze the sensitivity of the model to various parameters. Preliminary results of the TEVA method are available that illustrate applications to three drinking water distribution systems of a different sizes.

Partnerships:
EPA is the lead federal agency for protecting the water supply from terrorist acts and has emerged as a leader in the field of water security research. The TEVA program also takes advantage of expertise across the federal government and is a collaborative effort between the EPA, Sandia National Laboratories, and Argonne National Laboratories.

Impact:
The TEVA Program will reduce vulnerability of the nation's drinking water distribution systems to contamination by providing a dynamic, probabilistic assessment of the vulnerability of a system to a wide range of terrorist or accidental contamination events and an evaluation of potential threat mitigation and emergency response strategies.